

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appln. No. 09/988,669

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): An image recording method of recording a single pixel forming an image using a plurality of pulses comprising the step of:
~~expressing gradation of said single pixel using a first pulse-pulses expressing a superordination bit-bits not lower-order than a predetermined bit, each having a larger predetermined pulse width corresponding to said predetermined bit and a second pulse-pulses expressing a subordination bit-bits lower-order than said predetermined bit and having different pulse widths a-smaller than said predetermined pulse width.~~
2. (currently amended): The image recording method according to claim 1, said first pulse-pulses expressing said superordination bit having said larger pulse width lying at irregular intervals applied to said single pixel.
3. (currently amended): ~~An~~ The image recording method of recording a single pixel forming an image using a plurality of pulses, according to claim 1, further comprising the step of:
having activation or non-activation operation for each of said pulses, related to a specified bit forming image data.

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4. (currently amended): An image recording The method of claim 15, further comprising the step of:

~~expressing gradation using a first pulse having a larger pulse width expressing a superordination bit and a second pulse having a smaller pulse width expressing a subordination bit; and~~

having activation or non-activation operation for each of said pulses, related to a specified bit forming image data.

5. (currently amended): An image recording apparatus comprising:
an image recording unit which records an image in a first direction;
a transfer unit which relatively transfers said image recording unit and a recording medium in a second direction normal to said first direction; and
a record control unit which controls and records a single pixel using a plurality of pulses when said image is recorded, said record control unit expressing gradation for said image to be recorded, said record control unit expressing gradation for said image to be recorded using ~~a first pulse pulses expressing a superordination bit bits not lower-order than a predetermined bit, each having a larger predetermined pulse width corresponding to said predetermined bit and a second pulse pulses expressing a subordination bit bits lower-order than said predetermined bit and having different pulse widths a smaller than said predetermined pulse width.~~

6. (currently amended): The image recording apparatus according to claim 5, said first ~~pulse pulses expressing said superordination bit having said larger pulse width lying at irregular intervals applied to said single pixel.~~

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7. (currently amended): ~~An~~ The image recording apparatus according to claim 5,
comprising:

~~an image recording unit which records an image in a first direction;~~
~~a transfer unit which relatively transfers said image recording unit and a recording~~
~~medium in a second direction normal to said first direction; and~~
~~a record control unit which controls and records a single pixel using a plurality of pulses~~
~~when said image is recorded,—said record control unit having activation or non-activation~~
~~operation for each of said pulses, related to a specified bit forming image data.~~

8. (currently amended): ~~An~~ The image recording The apparatus of claim 12, wherein
comprising:

~~an image recording unit which records an image in a first direction;~~
~~a transfer unit which relatively transfers said image recording unit and a recording~~
~~medium in a second direction normal to said first direction; and~~
~~a record control unit which controls and records a single pixel using a plurality of pulses~~
~~when said image is recorded,—said record control unit expressing gradation for said image to be~~
~~recorded using a first pulse having a larger pulse width expressing a superordination bit and a~~
~~second pulse having a smaller pulse width expressing a subordination bit, and having~~
~~activation or non-activation operation for each of said pulses, related to a specified bit forming~~
~~image data.~~

9. (original): The image recording apparatus according to claim 5, said image recording
unit being provided a thermal head.

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10. (original): The image recording apparatus according to claim 7, said image recording unit being provided a thermal head.

11. (original): The image recording apparatus according to claim 8, said image recording unit being provided a thermal head.

12. (currently amended): ~~The apparatus of claim 5, An image recording apparatus comprising:~~

an image recording unit which records an image in a first direction;

a transfer unit which relatively transfers said image recording unit and a recording medium in a second direction normal to said first direction; and

a record control unit which controls and records a single pixel using a plurality of pulses when said image is recorded, said record control unit expressing gradation for said image to be recorded using a first pulse having a larger pulse width expressing a superordination bit and a second pulse having a smaller pulse width expressing a subordination bit,

said record control unit comprising:

a controller that generates a plurality of timing signals that are transmitted to respective frequency dividers to generate said plurality of pulses,

wherein at least one of said frequency dividers outputs a first frequency divided signal to a switching device, and at least another of said frequency dividers outputs a second frequency divided signal to a processing circuit that generates at least one output in accordance with stored data.

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13. (previously presented): The apparatus of claim 12, wherein said processing circuit generates outputs to respective ones of a plurality of line memory devices, each of which generates a line memory pulse in accordance with a clocking signal received from said controller.

14. (previously presented): The apparatus of claim 13, wherein said line memory pulse of each of said line memory devices is input to said switching device, which selects said line memory pulse from one of said line memory devices, and forwards said selected line memory pulse to said image recording unit.

15. (currently amended): ~~The method of claim 1, further comprising:~~ An image recording method of recording a single pixel forming an image using a plurality of pulses comprising the steps of:

expressing gradation using a first pulse expressing a superordination bit having a larger pulse width and second pulse of pulses expressing a subordination bit having a smaller pulse width;

generating a plurality of timing signals that are transmitted to respective frequency dividers to generate said plurality of pulses;

at least one of said frequency dividers outputting a first frequency divided signal to a switching device, and at least another of said frequency dividers outputs a second frequency divided signal to a processing circuit; and

said processing circuit generating at least one output in accordance with stored data.

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16. (previously presented): The method of claim 15, wherein said generating step comprises generating outputs to respective ones of a plurality of line memory devices, each generating a line memory pulse in accordance with a clocking signal received from said controller.

17. (previously presented): The method of claim 16, further comprising: inputting said line memory pulse of each of said line memory devices into said switching device; and said switching device selecting said line memory pulse from one of said line memory devices, and forwarding said selected line memory pulse to said image recording unit.

18. (currently amended): The apparatus of claim 7, An image recording apparatus comprising:

an image recording unit which records an image in a first direction;
a transfer unit which relatively transfers said image recording unit and a recording medium in a second direction normal to said first direction; and
a record control unit which controls and records a single pixel using a plurality of pulses when said image is recorded, said record control unit having activation or non-activation operation for each of said pulses, related to a specified bit forming image data,
wherein a pattern of generating said plurality of pulses is set to be random between the pixel positions in a horizontal direction to prevent cyclic irregularity.

19. (previously presented): The method of claim 1, wherein thermal patterns are made to be different between at least one neighboring pixels and neighboring lines of image data.

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20. (currently amended): The image apparatus of claim 5, said record control unit comprising a data storage unit that stores data indicative of the correlation between said superordination ~~bit- bits~~ and said ~~first-pulse pulses~~, and said subordination ~~bit-bits~~ and said ~~second-pulse pulses~~.

21. (previously presented): The method of claim 1, wherein a gradation of N levels is expressed using fewer than N-1 pulses.

22. (previously presented): The method of claim 3, wherein a gradation of N levels in said single pixel is expressed using fewer than N-1 pulses.

23. (new): The apparatus of claim 18, wherein said record control unit expresses gradation for said image to be recorded using a first pulse having a larger pulse width expressing a superordination bit and a second pulse having a smaller pulse width expressing a subordination bit.

24. (new): The apparatus of claim 12, wherein said first pulse expressing said superordination bit having said larger pulse width lies at irregular intervals applied to said single pixel.

25. (new): The method of claim 15, wherein said first pulse expressing said superordination bit having said larger pulse width lies at irregular intervals applied to said single pixel.